
A REPORT ON MARGARINE
Report of The Food
and Nutrition Board
Washington

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*Report of
The Food and Nutrition Board*

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A REPORT ON MARGARINE



Prepared by the
Committee on Fats

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June, 1943

REPORT
of the
FOOD AND NUTRITION BOARD
of the
NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue
WASHINGTON 25, D. C.

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A REPORT ON MARGARINE

I. THE CURRENT FAT SITUATION

The United States continues to be faced with a serious fat supply problem. Despite an increased production of about two billion pounds or nearly 25 per cent over the past three years, the fat supply situation continues quite tight. About half of the increased domestic production has been offset by loss of imports from the far Pacific. And the remainder of the increase has been more than offset by the large requirements for exports under Lend-Lease. Moreover, military demands for industrial oil and food fats are at unprecedented levels. To meet these export war requirements and to prevent a depletion of normal working stocks, it has been necessary to limit the use of fats for civilian consumption for food and in the manufacture of industrial products such as paint and soap.

Even with this action, factory working stocks are now below normal and may go lower during the next several months. Thus, unless we can expand supplies, only limited reserves will be available for meeting such contingencies as possible decline in crop yields because of drought, or for meeting the relief needs of peoples liberated from the yoke of the aggressor nations.

Faced with this situation, it is imperative that further action be taken, not only to conserve supplies, but to augment them in the most efficient manner possible. This will mean cutting out all waste and economizing on fats by confining their use mainly to products most essential to health and nutrition and to the prosecution of the war effort. It also will mean using our land and other resources in producing those fat-bearing products which will yield the largest amount of fat per unit of resources used. During the remainder of the emergency this probably will call for obtaining an increasing proportion of our food fats from vegetable oil crops, particularly soybeans and peanuts, and hence increased reliance upon such manufactured products as margarine and shortening.

An earlier report of this committee (38) pointed out a minimum requirement of approximately 68 pounds of dietary fat per individual per year. Two sources were indicated in terms of (a) "visible" fat, such as butter, margarine, lard, shortenings, salad and cooking oils, and (b) "invisible" fat associated with foodstuffs, such as dairy products other than butter, meat and meat products, eggs, nuts, cacao products, cereals, vegetables, fishery products, and fruits (listed in the order of their contribution of fat). It was estimated that the annual per capita minimum requirement for dietary fat could be met in the United States through the supply of 40 pounds of "invisible" fat and 28 pounds of "visible" fat.

The same report urged that "full use should be made of the country's production of butter, because of its vitamin A value and because there is no need or use for butter in industrial channels." Next in consideration, for food use, were placed margarine fortified with vitamin A, any natural vitamin A containing oils, and such fats as lard, soybean oil, cottonseed oil, corn oil, and peanut oil which are needed to supply generous amounts

of the essential unsaturated fatty acids. Current shortages of butter for civilian use require the consideration of other "visible" fats, such as margarine for replacement for both physiological and psychological reasons.

II. THE RELATIVE NUTRITIVE VALUE OF DIFFERENT FATS

Accumulated data show definitely that many animals are benefited by a diet containing an amount of fat in excess of the essential fatty acid requirement. There is not complete agreement in the results from different laboratories as to the comparative value of different fats fed at the same level. Furthermore, with repeated experiments the results are not always the same in a given laboratory. Differences between fats will be found at one time which are statistically significant but which are not reproducible at another time with a new group of rats and a new batch of the same kind of fat.

There are numerous recorded experiments which show that oils as widely different as coconut oil, butter, lard, corn oil, linseed oil and hydrogenated shortenings and margarine have essential nutritional equivalence as measured by growth and reproduction. This is true in spite of the fact that each of the food fats has a specific influence on the composition and physical properties of the body fat. Without attempting to cite all the literature a few cases will be used as examples. In Burr's laboratory, there are records of groups of rats on diets with 20 per cent of lard, Crisco, Mazola, margarine and butter which have grown to approximately the same size at the same rate. Sure (14) found that his diets containing 15 per cent of lard, butter fat, Crisco, olive oil or wheat germ oil were equally effective in promoting lactation. Deuel (15) states that, over a period of several years with large groups (60 rats on each fat) of animals reared on skimmilk powder to which the test fats were added, no differences in growth were found in the first three weeks or the following three months on corn, cottonseed, olive, peanut, soybean oils, butter, or margarine fortified with vitamin A. Nor were there differences in reproduction or lactation performance.

On the other hand, there are numerous recent reports of definite differences in the relative nutritive value of fats. Boer (16) postulates a new growth factor in butter acids because his rats grow more rapidly on these than on olive oil. Opposed to this is the finding of Euler, Euler and Saberg (17) that margarine promotes better growth than butter fat when homogenized into skimmilk. Boutwell, Geyer, Elvehjem and Hart (18) found more rapid early growth (during the first three weeks) on butter fat than on other oils homogenized into mineralized skimmilk while Freeman and Ivy (19) did not find statistically significant differences in early growth when commercial evaporated milk was compared with commercial filled milk (coconut oil). But after three months the evaporated milk animals were significantly larger. Harris and Mosher (20) have found that results can be reversed by using animals of different age, weanling rats growing more rapidly on butter fat and older rats more rapidly on coconut oil. Whitnah (21) has recently reported that

when very young rats (6 to 11 days of age) were kept on diets differing only in the fat those receiving butter oil were heavier when 56 days old and made less errors in learning tests than their controls on cottonseed oil.

The explanation of these apparently conflicting results must lie in the experimental method or in the quality of the fat being fed under a given name.

Factors that are known to affect the results with fat-containing diets are: (a) the composition of the non-fatty portion of the diet, (b) the level of fat in the diet, (c) the age and condition of the animal, (d) the species (and possibly strain) of animal, and (e) the quality of the fat sold under a given name.

A few citations will illustrate the above points. Boutwell, Geyer, Elvehjem and Hart (22) show that only when lactose is the chief carbohydrate is butter fat superior to corn oil. On diets of dextrose, sucrose, dextrin or starch the rats receiving corn oil are slightly larger.

The above workers also find that with increasing amounts of corn oil in the diet, it becomes progressively poorer. In their laboratory it has been found that very high levels of some liquid fats are not good while solid fats are well used at almost any level. Hoagland and Snider (23) found cottonseed oil diets to be relatively much poorer at a 30 per cent than at a 5 per cent level.

The order of relative efficiency of different fats may also be reversed by a partial deficiency in the diet of such constituents as thiamine (24) (25) or vitamin A (26).

The citations given above emphasize adequately the importance of age of the animal. In the work of Boutwell *et al.*, it is maintained that any superiority of butter over other fats must be demonstrated at a very early age and the other workers have reported a reversal of the results by continuing experiments for longer periods or by starting with animals of different ages.

The species and conditions of the animal are very important. McCay and Paul (27) have shown that the guinea pig is much less able than the rat, rabbit or sheep to utilize hard fats. Calves (28) are very intolerant of the common liquid, unsaturated oils which are well utilized by the rat. Premature infants and twins have difficulty absorbing fats and show abnormally large responses to a change from butter fat to olive oil (29).

That the quality of the fat at the time of consumption markedly affects the results obtained from nutrition experiments can be illustrated by a few striking examples. The effects of rancidity cannot be over emphasized. This develops rapidly in simplified diets at room temperature (30) especially when the pure vitamins are used instead of yeast. Its destructive effects on several vitamins are well known. In addition, the effect on appetite may be so large as to practically control the growth rate in experiments employing *ad lib.* feeding. Deuel (15) states that rats select diets containing commercial butter flavor or diacetyl. It is also a striking fact that there is no record of a synthetic ester or

glyceride having produced as good rat growth as the natural fats, a result that can be attributed to trace materials which are either toxic or distasteful.

It must be these more subtle factors rather than the known physical and chemical constants of fats that have determined many of the differences reported in the literature. It has been impossible in most cases to correlate the results with digestibility or with the known facts about storage, mobilization or utilization of the constituent fatty acids. Very hard fats may be so indigestible that they are clearly harmful, but it has not been demonstrated that small changes in digestibility measurably alter the effectiveness of a fat for growth production. Two experiments illustrate well the effects of unknown properties of fats sold under the same trade names. Hoagland and Snider (31) measured the gain in weight of rats fed diets containing 5 and 15 per cent of several lards and hydrogenated vegetable shortenings. The average gain on the lards was practically identical with the average gain on the vegetable shortenings. However, the difference between lard No. 4027 and lard No. 4028 was highly significant (odds 99 to 1). Smaller differences were found among the shortenings and the authors were unable to correlate the growth with any known property of the fats. Similarly, in unpublished work from Wisconsin (32) seven margarines differed much more among themselves than their average differed from butter. In the latter work an attempt was made to use a mixture of carbohydrates similar to that of a human diet of mixed natural foods.

It seems clear, therefore, that experiments may be designed in which growth and reproductive performance can be materially altered by changing the type of fat in the diet. However, with not more than 20 per cent of fat in the usual mixed diet the difference between fats sold under the same trade name may often be greater than the difference between unlike fats of diverse origins. Furthermore, upon repetition, factors, of which the experimenter is unaware, may bring about a reversal in results.

A recent critical discussion of the comparative nutritional value of butter and margarine (39) concluded, ". . . at present there is no scientific evidence to show that use of fortified oleomargarine in an average adult diet would lead to nutritional difficulties. A similar statement is probably justified in the case of growing children, but preliminary results from animal experiments indicate that more work is necessary before any specific conclusions can be made."

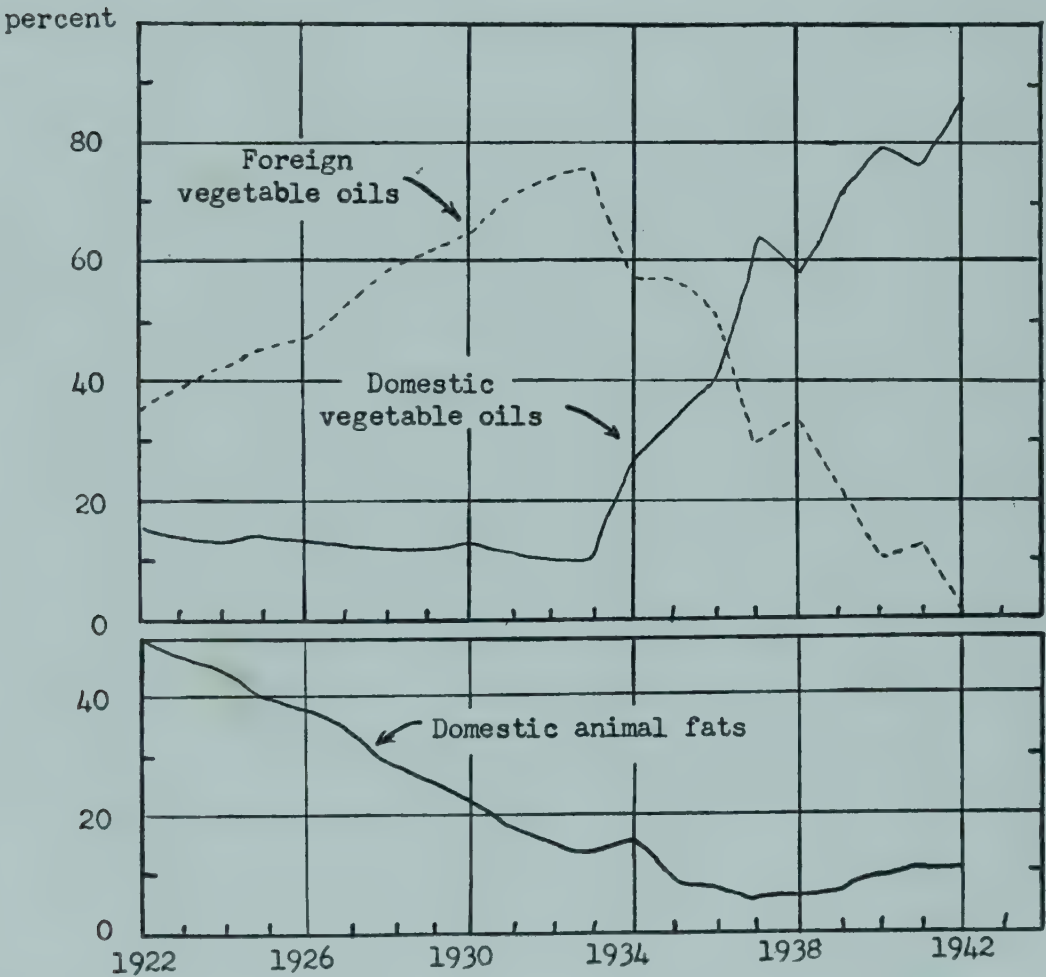
III. COMPOSITION OF MARGARINE

Figure 1, taken directly from a February 1943 report of the Bureau of Agricultural Economics (12), shows the percentages of vegetable and animal fats and oils used in margarine during the period 1922 to 1942. The most conspicuous developments in this period were (a) the marked decline in the proportion of animal fats and increase in pro-

portion of vegetable oils * and (b) the sharp increase in the proportion of domestic vegetable oils since 1933 and the corresponding decline in the proportion of imported oils. The latter development immediately followed the introduction of excise taxes imposed by various States against the use of foreign oils (the so-called "Domestic Fat Laws") and the imposition by the Federal Government of excise taxes on certain imported oils and oils processed from imported materials. During this period there was a very significant increase in the use of cottonseed oil.

FIGURE 1

Vegetable and Animal Fats and Oils Used in Margarine as Percentage of Total Fats and Oils, 1922-42



Data for 1942 are preliminary.

Individual animal and vegetable fats and oils used in margarine manufacture during 1931-42 are given in Table I (33). A decade ago, coconut

* The sharp decline in the use of oleo and other animal oils and the greatly increased use of vegetable oils makes preferable the term "margarine" to "oleo-margarine."

oil was the most important, accounting for 70 to 75 per cent of all fats and oils used in margarine. During the period 1931-42, the proportion of coconut oil declined to about 10 per cent in 1941-42 and cottonseed and soybean oils rose to 51 and 26 per cent, respectively, in 1941. No coconut oil or other oils containing high amounts of lauric acid and glycerine are now permitted for margarine manufacture.

At least a portion of the vegetable oils such as cottonseed and soybean used in making margarine are first hardened by hydrogenation for the production of a more suitable product. In the process of hydrogenation, the unsaturated fatty acids (e.g., oleic, linoleic and linolenic) are partially converted to stearic acid plus a mixture of isomers of the original acids with some shifting of the double bonds and the introduction of some new geometrical configurations. Few data are available on the fatty acid compositions of commercial margarines. Recently, Andrews and Richardson (35) found considerable variation in a series of 57 market samples representing each available brand of margarine. Their study showed, however, that many of the samples contained appreciable quantities of linoleic acid (range 1.3 to 23.4 per cent; median, 9.9 per cent). The linoleic acid content was calculated from iodine and thiocyanogen numbers, a method which is known to give results not in agreement with biological tests or isolation of derivatives.

Materials other than animal or vegetable fats and oils are customarily used in margarine manufacture. From 60 to 75 million pounds of milk or skim milk are used annually. A microorganism or enzyme may be added to the pasteurized milk to produce a lactic acid flavor or an aroma, or the artificial flavoring diacetyl may be added to enhance the flavor of the final product. Emulsifying agents such as lecithin, monoglycerides or diglycerides, or monoglycerides and diglycerides in combination with their sodium sulfo-acetate derivatives may be used. The addition of vitamin A is now being carried on to the extent that at least 90 per cent of all margarine for table use is fortified (36).

In 1941, the Food and Drug Administration of the Federal Security Agency adopted a Definition and Standard of Identity for Oleomargarine (37) under authority of the Food, Drug and Cosmetic Act of 1938, concluding that the standard "will promote honesty and fair dealing in the interest of consumers." The definition and standard was based primarily on customary acceptable commercial practice in the manufacture of margarine. It requires that when emulsification agents are used, they are not to exceed 0.5 per cent of the weight of the finished product; sodium benzoate, added as a preservative, is not to exceed 0.1 per cent of the weight of the finished product. The standard further requires that all margarine have a minimum fat content of 80 per cent, and margarine to which vitamin A is added have not less than 9,000 United States Pharmacopoeia Units per pound, "... in order that the oleomargarine, a product used by some consumers for the same purpose as butter, will have a vitamin A content comparable to that of butter, which is, on the average, approximately 9,000 United States Pharmacopoeia Units per pound" (37).

TABLE I—Margarine: United States factory consumption of individual animal and vegetable oils used in the manufacture thereof, 1931-41

	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941*	1942**
	Quantity (million pounds)											
Animal fats and oils:												
Oleo oil.....	18.8	12.5	15.1	21.9	18.2	18.3	12.3	13.4	11.9	14.3	18.4	22.5
Lard, neutral.....	9.7	9.4	9.0	7.5	3.0	2.2	1.7	1.5	1.3	5.1	8.3	8.1
Oleostearin.....	4.9	3.7	3.1	3.5	2.6	3.6	3.4	3.3	3.1	3.4	3.1	2.9
Oleo stock.....	.8	.5	.8	1.4	2.4	1.9	1.3	1.5	1.0	1.3	.....	3.9
Other animal fats and oils.....	.3	.....	.....	.....	.....	.....	.....	.....	.1	.....	.....	.4
Total.....	34.5	26.1	28.0	34.3	26.2	26.0	18.7	19.7	17.4	24.1	29.8	37.8
Vegetable oils:												
Cottonseed.....	16.0	15.0	18.0	54.8	99.5	108.1	173.6	142.9	98.7	116.0	150.0	166.7
Soybean.....	133.1	123.2	150.1	123.7	174.3	150.5	73.8	39.9	70.8	87.1	75.6	133.4
Coconut.....	.....	.....	.....	.....	1.8	16.1	14.6	89.5	38.5	21.8	29.8	3.5
Babassu.....	.....	.....	.....	.....	.4	2.4	7.9	11.5	13.9	6.1	11.5	.3
Palm kernel.....	4.6	2.5	2.6	2.7	4.4	4.1	2.9	4.7	.5	.....	1.0	.9
Peanut.....	1.1	.3	.6	1	1	1.2	1.8	3.6	2.4	1.7	2.2	1.7
Corn.....	2.4	.3	.....	.1	.....	1.4	1.1	.6	1.5	.4	5.0	1.4
Palm.....	.3	.....	.....	.....	.3	.5	.....	.....	.....	.....	.....	.8
Other vegetable oils.....	.....	.....	.....	.....	.....	.....	.....	.1	.....	.....	.....	.....
Total.....	157.1	141.1	171.6	181.3	282.5	298.6	307.5	292.8	225.3	233.1	265.1	308.7
Grand Total.....	191.6	167.2	199.6	215.6	308.7	324.6	326.2	312.5	242.7	257.2	294.9	346.5
	Percent of total quantity											
Animal fats and oils:												
Oleo oil.....	9.8	7.5	7.6	10.2	5.9	5.6	3.8	4.3	4.9	5.6	6.2	6.5
Lard, neutral.....	5.0	5.6	4.5	3.5	1.0	.7	.5	.5	.5	2.0	2.8	2.4
Oleostearin.....	2.6	2.2	1.5	1.6	.8	1.1	1.0	1.0	1.3	1.3	1.2	.8
Oleo stock.....	.4	.3	.4	.7	.8	.6	.4	.5	.4	.5	.....	1.1
Other animal fats and oils.....	.2	.....	.....	.....	.....	.....	.....	.....	.1	.....	.....	.1
Total.....	18.0	15.6	14.0	16.0	8.5	8.0	5.7	6.3	7.2	9.4	10.2	10.9
Vegetable oils:												
Cottonseed.....	8.4	9.0	9.0	25.4	32.2	33.3	53.2	45.7	40.6	45.1	50.9	48.1
Soybean.....	.3	.2	.2	.2	.6	4.4	9.8	12.8	29.2	33.8	25.7	38.5
Coconut.....	69.4	73.7	75.2	57.3	56.5	46.4	22.6	28.6	15.9	8.4	10.0	1.0
Babassu.....	.....	.....	.....	.....	.6	5.0	4.5	3.7	5.7	2.4	.3	.1
Palm kernel.....	.....	.....	.....	.....	.1	.7	2.4	1.5	.2	.....	.3	.3
Peanut.....	2.4	1.5	1.3	1.3	1.4	1.3	.9	1.2	1.0	.7	.7	.5
Corn.....	.5	.2	.2	.2	.2	.4	.6	.2	.2	.2	.2	.4
Palm.....	1.3	.2	.3	.2	.2	.4	.3	.....	.2	.2	1.7	.2
Other vegetable oils.....	.2	.....	.....	.....	.1	.1	.....	.2	.....	.....	.....	.....
Total.....	82.0	84.4	86.0	84.0	91.5	92.0	94.3	93.7	92.8	90.6	89.8	89.1
Grand Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Preliminary (taken from Table 4, Reference 34).

¹ Less than 50,000 pounds.

² Less than 0.05 percent.

** Source—Monthly Reports of the Commissioner of Internal Revenue.

IV. MARGARINE LEGISLATION

A. Purpose

Almost from the beginning of the margarine industry in 1874 Federal and State taxes, license fees, and regulatory laws have been applied to the manufacture, distribution and sale of margarine. The constitutionality of such legislation has depended largely upon the purpose for which the laws were passed.

During the early period of margarine manufacture regulatory laws were designed to prevent adulteration, misbranding, and various forms of substitution and fraud. With the introduction of Federal pure food laws, however, fraudulent practices were more readily controlled; and with the adoption in 1941 by the Food and Drug Administration of a Definition and Standard of Identity for Oleomargarine the manufacture of the product was standardized as indicated above. Even before the adoption of these standards, the Supreme Court of the United States recognized a particular brand of margarine to be ". . . a nutritious and pure article of food, with a well established place in the dietary." (4)

In its decision on the New Hampshire margarine law, the Supreme Court said, in part:

"In whatever language a statute may be framed, its purpose must be determined by its natural and reasonable effect." (2)

Mickle (3) commented recently on that decision, as follows:

"Although the Supreme Court had in the case of the New Hampshire law requiring that butter substitutes be colored pink rendered its decision on the basis of the purpose underlying the law, it declined to examine the underlying purpose of legislation which on the surface appeared to be tax legislation. It was the attitude of the court that the fact that it might consider a tax oppressive or even destructive in its effect did not justify it in attempting to limit or control the discretion of Congress in its exercise of the taxing power."

The suggestion has frequently been made that both State and Federal laws governing margarine were designed, in part at least, to "protect" the farmers and the dairy industry. Taylor, Burtis and Waugh (1) point out that:

"Generally those favoring margarine legislation have been frank to say that their object is to 'protect' the dairy industry. When the Washington tax of 15 cents per pound was carried to the Supreme Court the sponsors of the act candidly stated that their purpose was to help the butter industry and they made their arguments on that basis."

It is of especial interest in this connection to study the per capita consumption of margarine and butter and the relation between margarine and butter prices. Per capita consumption figures (12) for the period from 1910 to 1943 are given in Table II. The highest consump-

tion of margarine occurred during the prosperity periods, 1918-20 and 1928-29, and after the drought in 1934, when lard prices rose steeply. Butter consumption was lowest during 1918-20 and dropped slightly again in 1928-29. During the high margarine consumption period of 1918-20, however, butter production was relatively small and exports of butter were high. It was in this same period, 1918-20, that the retail price of butter reached its high of 70.1 cents per pound. Interestingly enough, the lowest retail price of butter came in 1932, when there was a high per capita consumption of butter and one of the lowest per capita consumptions of margarine.

A special circular (7) of the Wisconsin College of Agriculture commented in 1942 on these facts, as follows:

“There is no evidence in the past that oleomargarine has been the important factor causing low butter prices. In 1932 there were about 11½ pounds of butter consumed for every pound of oleomargarine

TABLE II—Per capita consumption of butter and of margarine in the United States 1910 to 1941

Year	Butter <i>Pound</i>	Margarine <i>Pound</i>	Total <i>Pound</i>
1910.....	18.3	1.6	19.9
1911.....	18.5	1.4	19.9
1912.....	16.6	1.5	18.1
1913.....	16.5	1.5	18.0
1914.....	17.0	1.4	18.4
1915.....	17.2	1.4	18.6
1916.....	17.3	1.8	19.1
1917.....	15.8	2.7	18.5
1918.....	13.8	3.3	17.1
1919.....	15.3	3.4	18.7
1920.....	14.8	3.4	18.2
1921.....	16.2	2.0	18.2
1922.....	17.1	1.7	18.8
1923.....	17.8	2.0	19.8
1924.....	18.0	2.0	20.0
1925.....	18.0	2.0	20.0
1926.....	18.5	2.0	20.5
1927.....	18.1	2.3	20.4
1928.....	17.5	2.6	20.1
1929.....	17.4	2.9	20.3
1930.....	17.3	2.6	19.9
1931.....	18.1	1.9	20.0
1932.....	18.2	1.6	19.8
1933.....	17.9	1.9	19.8
1934.....	18.3	2.1	20.4
1935.....	17.3	3.0	20.3
1936.....	16.7	3.1	19.8
1937.....	16.7	3.1	19.8
1938.....	16.9	3.0	19.9
1939.....	17.8	2.3	20.1
1940.....	17.2	2.4	19.6
1941.....	16.6	2.7	19.3
1942.....	16.6	2.7	19.3
1943*	13.0	4.8	17.8

* Estimated consumption; may be reduced somewhat.

and consumers spent \$15 for butter for every dollar spent for oleomargarine. If all the money spent for oleomargarine that year had been spent for butter, the retail price of butter would have been increased 1.7 cents per pound. This would not have solved the dairy farmer's problem in 1932. There is no reason, however, to assume that even though oleomargarine had been eliminated from the market all the money spent for oleomargarine would have been spent for butter."

In 1931, eight States adopted excise taxes on all margarine. Immediately margarine sales dropped about 80 per cent (cf. Table IV). Kane (9) showed clearly, however, that in spite of this reduced margarine consumption the relative prices received for butterfat and farm butter by farmers in these States declined and that the total cash farm income from dairy products in these States declined from 23.0 to 21.1 per cent, expressed as percentage of the national total, a relative decline of 8 per cent. Discussing these data, Kane remarks:

"Of course, it is possible that these declines might have been even more severe had not the margarine taxes been imposed, but, to say the least, there appears to be nothing in these figures to support the belief that the butter and dairy industries were benefited by the imposition of these taxes."

The existing Federal taxes on colored margarine are for the same "protective" purpose. They were intended "... to make the product sell on its own merits and in its own clothes" and "... because the farmers of this nation hold that yellow is the trade-mark of butter. Since the dawn of civilization yellow has been associated with the color of butter in the minds of consumers. In effect, yellow has been accepted as the trade-mark of butter, both in usage and in legal pronouncements. For this reason the dairy industry has every right to expect and demand that this trade-mark shall continue to be protected by both federal and state laws." (5) The same source states flatly that the reason Federal taxes were placed on margarine paralleled that for adulterated butter: "to stop its manufacture and sale."

More recently other arguments than those which assume margarine to be an unwholesome food or a fraud have been used to emphasize and clarify the purpose of existing Federal and State laws. The principle of "equalizing the burden of taxation" has been used in support of excise taxes on margarine in States where dairying is an important occupation. It is reasoned that margarine should bear an equivalent proportion of the heavy taxes paid by the dairy industry. Such reasoning, while it has been used effectively, as in the Washington law, "is simply not acceptable to most students of statistics and public finance" (1) (cf., also (6)). It is pointed out (1) that similar reasoning might lead to taxation on butter brought into certain southern States where cotton bears an appreciable burden of taxation or, in Maine, to a sales

tax on bread made largely from western wheat to offset the heavy tax burden of the Maine potato growers.

A variation of this argument arises because production costs place butter at a competitive disadvantage with margarine. It has led to the suggestion that States should enact margarine taxes sufficient to equalize the differences. Taylor and his associates (1) observe, however,

“If state taxation is to be based upon the principle of equalizing cost of production, then the western dairying states will be the first to object, for certain populous Eastern States, which form the great market for western butter and cheese, would by this reasoning, be justified in placing a sales tax on dairy products when imported from Western States—a tax fully justified by differences in the cost of production in the two areas.”

At times, especially when butter prices are low, the same argument is encountered in another form to the effect that margarine legislation is a boon to an important yet temporarily distressed dairy industry. This point of view assumes that such legislation results in the use of butter in preference to margarine which would ultimately raise either the price or the consumption of butter (or both). However, as Taylor, Burtis and Waugh (1) indicate, the rise in the price of butter in those States with heavy margarine taxes could not be greater than in other States so long as interstate movements of butter were unhampered.

Occasionally an attempt is made to consider margarine taxes in the category of ordinary excise taxes levied for the purpose of collecting revenue. It is clear, however, that excise taxes cannot at the same time be effective sources of much revenue and provide bread protection for specialized interests. Table III reveals that only two States derived any appreciable revenue from excise taxes in 1937-38. Iowa collected about \$315,330 and Utah, about \$42,335 from excise taxes of five cents per pound. In the same fiscal year, Pennsylvania derived \$424,700 and California, \$59,150 from license fees. Other States with higher excise taxes and/or license fees received much less, e.g., Wisconsin, a total of \$14.42 and several States absolutely nothing.

Thus, the purposes of margarine legislation have been (a) to prohibit fraudulent sale of margarine as butter, (b) to “protect” the farmers and the dairy industry, (c) to “equalize the burden of taxation,” (d) to equalize production costs between butter and margarine, and (e) to restrict the use of yellow coloring agents for butter alone.

The yellow color of a high grade, summer butter is due primarily to its carotene content. During fall and winter, the carotene content of butter is markedly reduced and the butter manufacturers resort to the use of coal tar dyes (FD & C yellow #3, 1-Phenylazo-2-naphthylamine and FD & C yellow #4, 1-o-Tolylazo-2-naphthylamine) to maintain uniformity in the color of the finished product. The addition of coal tar dyes to either butter or margarine does not improve the nutritional value of either product. Summer butter with its high content of carotene provides a good source of total vitamin A. The vitamin A potency of

fall and winter butter is reduced, however, corresponding to the drop in carotene content. Fortified margarine, according to the regulations of the Food and Drug Administration, must contain not less than 9,000 U.S.P. Units of vitamin A per pound. This amount of vitamin A is not so high as the best grade summer butter, but is above the average winter butter. The addition of vitamin A to margarine does not noticeably alter its white appearance. It is obvious, therefore, that the color of either product is not a criterion of inherent nutritive value.

TABLE III—Revenue from margarine excise taxes and license fees, by States, for the fiscal year ended July 31, 1938—(from Table 1(1)).

State	Excise Dollars	Revenue from License Dollars	Total Dollars
Excise tax on all margarine			
Idaho.....	1,430.00	330.00	1,760.00
Iowa.....	315,329.90	.....	315,329.90
Utah.....	42,334.64	1,720.00	44,054.64
Oklahoma.....	0	0	0
North Dakota.....	503.40	14.00	517.40
South Dakota.....	4,585.50	.....	4,585.50
Tennessee.....	.....	.....	14,603.00
Washington.....	0	.....	0
Wisconsin.....	13.42	1.00	14.42
License fees only			
California.....	{ no excise taxes	59,150.19	59,150.19
Connecticut.....		9,700.05	9,700.05
Mississippi.....		Not available	.....
Montana.....		9,100.00	9,100.00
Pennsylvania.....		424,700.74	424,700.74
Vermont.....		11,117.45	11,117.45
Excise on certain types of margarine			
Alabama.....	0	.....	0
Arkansas.....	0	.....	0
Colorado.....	0	375.00	375.00
Florida.....	0	.....	0
Georgia.....	0	.....	0
Kansas.....	0	.....	0
Louisiana.....	.....	.....	.....
Maine.....	0	.....	0
Minnesota.....	0	1,981.00	1,981.00
Nebraska.....	0	3,300.00	3,300.00
New Mexico.....	0	.....	0
North Carolina.....	2.40	2,400.00	2,402.40
South Carolina.....	.....	.....	.....
Texas.....	0	.....	0
Wyoming.....	2,274.40	.....	2,274.40

B. Effect

It is difficult to assess the effect of margarine legislation in quantitative terms. There is, however, no doubt in the minds of most people that existing legislation seriously interferes with the manufacture, distribution, and consumption of margarine. Unfortunately, there are few quantitative studies on margarine consumption by States or by individuals in various income level groups. Furthermore, there has not been

reported any quantitative measure of the consumer psychology regarding the acceptance and use of margarine.

The Wisconsin circular (7) quoted above stated two effects of State and Federal margarine laws: "First, they have practically eliminated the sale of colored oleomargarine. Second, they have caused the manufacturers to change from the use of foreign to the use of domestic fats and oils in the making of the product."

A report of the Commissioner of Internal Revenue for the 1942 fiscal year bears out the fact that little colored margarine is sold, for there were only 34 retail dealers licensed (at \$48 per year) to sell colored margarine as compared with 163,791 retail dealers licensed (at \$6 per year) to sell uncolored margarine in the entire country. The same source indicates that only about 25 per cent of the retail grocers in the country were then licensed to sell uncolored margarine.

A brief dated March 10, 1943, prepared by Mr. Charles H. Von Tagen, Secretary and Director of Organization, the Pennsylvania Grocers Association, shows clearly how margarine is distributed in Pennsylvania under the existing legislation (40). For example, in Philadelphia County, 128 licenses were issued to chain stores, 26 to independents; in Allegheny County, 263 licenses were issued to chain stores, 81 to independents; in Lackawanna County, 42 to chain stores, 7 to independents; in Dauphin County, 45 to chain stores, 17 to independents. The total number of retail margarine licenses taken out during 1942 in Pennsylvania was 3,150, representing 9.6 per cent of the grocery stores in Pennsylvania. Von Tagen remarks that the "license fee is both prohibitive and punitive and it places 90 per cent of the grocers in Pennsylvania at a distinct disadvantage in the competitive relations with corporate chain stores."

Taylor, Burtis and Waugh (1) showed clearly the effect of State excise taxes on the number of retail dealers licensed to sell margarine before and after the adoption of margarine laws. The data in Table IV are taken from their figures.

TABLE IV—Effect of margarine taxes on the number of retail dealers licensed to sell margarine.
(Data taken from Table 2 (1).)

States	Excise per pound <i>Cents</i>	Retail Dealers		Percentage change 1928 to 1937 <i>Per cent</i>
		"Before" (1928) <i>Number</i>	"After" (1937) <i>Number</i>	
Idaho, Iowa, Utah.....	5	8,832	4,281	-51.5
North and South Dakota....	10	8,148	712	-91.3
Tennessee, Oklahoma.....				
Washington, Wisconsin.....	15	8,993	14	-99.8
Total.....		25,973	5,007	-80.7

These above data are all the more significant when it is considered that domestic fat laws were introduced in 12 States during the same period yet the total number of retail grocers licensed to sell margarine in these States increased from 23,175 to 36,985 (+51.6 per cent).

Twenty-five States with no margarine excise tax similarly showed an average increase of 11 per cent. With respect to these data, Taylor, Burtis and Waugh point out that:

“Undoubtedly factors other than taxes are responsible for some of the changes shown in the tables. Moreover, number of retail stores is not a perfect measure of consumption changes. Certainly the exact percentages shown should not be taken too seriously. Yet the data do create a strong presumption for the conclusion that margarine excises, and probably to some extent also high retail license fees, do substantially curtail margarine consumption.”

Ultimately the effect of margarine taxes is reflected by an increased price to the consumer. Unfortunately, the burden of taxation falls most heavily on those who are least able to pay, for the highest proportion of margarine consumption is in families with low income. The latter fact is borne out in Table V (8). Even in States where margarine taxes are so high that the food is not sold, the effect is even worse on the low-income consumer as Kane (9) points out, for:

“... he is prevented, in effect, from purchasing a product which he greatly needs, and is forced either to purchase a higher priced product, butter, which he can hardly afford, or to use some less desirable substitute, or to do without.”

TABLE V—Average quantity of butter and oleomargarine purchased per household per week in the United States by net money income—Spring, 1942.

Net money income class (annual rate)	Household size in week-equiv- alent persons*	Quantity purchased per household per week	
		Butter	Margarine
<i>Dollars</i>	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>
Under 500.....	3.03	0.30	0.18
500-999.....	3.16	0.61	0.29
1,000-1,499.....	3.37	0.87	0.30
1,500-1,999.....	3.29	1.15	0.21
2,000-2,999.....	3.44	1.25	0.17
3,000 or over.....	3.80	1.68	0.10
All classes.....	3.41	1.01	0.20

* Represents 91.7 per cent of the civilian non-institutional population; 21 meals equal 1 week-equivalent person.

C. Regulatory Laws

The production, distribution and sale of margarine is regulated by both Federal and State legislation. Federal laws affect the country as a whole and both retard and impede interstate commerce. State laws also have the effect of restricting interstate commerce.

1. Federal legislation

The existing Federal laws are three-fold:

- a. An excise tax of $\frac{1}{4}$ cent per pound for uncolored margarine and 10 cents per pound for colored margarine.

- b. License fees on the distributors of margarine as follows:
 - (1) Manufacturers—\$600 per year.
 - (2) Wholesalers of colored margarine—\$480 per year.
 - (3) Wholesalers of uncolored margarine—\$200 per year.
 - (4) Retailers of colored margarine—\$48 per year.
 - (5) Retailers of uncolored margarine—\$6 per year.
- c. Specific legislation covering purchase of margarine for Federal institutions and the Army and Navy.

The first of these Federal laws mentioned above may be considered the most restrictive. The excise tax of 10 cents per pound on colored margarine practically stopped its sale, as shown above. This feature of Federal taxation, however, would not retard its sale if the consumer could be brought to understand that the uncolored product has the same nutritional value as the colored product.

The license fee on manufacturers restricts the use of oleomargarine because of the definition given to "manufacturers". Acts of Congress (13) define the liability to special tax as a manufacturer under the following situations:

"... any person that sells, vends, or furnishes oleomargarine for the use and consumption of others, except to his own family table without compensation, who shall add to or mix with such oleomargarine any substance which causes such oleomargarine to be yellow in color, determined as provided in subsection (b) of section 8, shall also be held to be a manufacturer of oleomargarine within the meaning of this Act and subject to the provisions thereof."

Interpreted under Regulations No. 9 of the Bureau of Internal Revenue (10) there are included (a) dealers, (b) eating places, (c) institutions, and (d) demonstrators. Thus, a proprietor of a hotel, boarding house, restaurant or other eating place which colors and serves margarine to paying guests or employees must pay the manufacturers tax of \$600 per year. It is necessary to pay not only the manufacturers tax but also the per pound tax of 10 cents on the colored product.

Until recently, Congress has frequently denied some institutions and agencies for which it appropriates money the right to purchase margarine. Not all Federal institutions are prohibited from purchasing margarine. In the past, restrictions have been placed in the appropriation bills for the Army, Navy, Veterans' Administration and St. Elizabeth's Hospital. The Independent Offices Appropriation Act for 1944 has already passed both the House and the Senate without the usual restriction against margarine. A special Act which would permit St. Elizabeth's Hospital to use margarine for the duration of the war has passed the House and is now pending in the Senate. For the past year, the regulations in effect under the Army War Appropriations Bill were as follows:

"That none of the money appropriated in this act shall be used

for the purchase of oleomargarine or butter substitutes for other than cooking purposes, except to supply an expressed preference therefor, or for use where climatic or other conditions render the use of butter impracticable."

2. State legislation.

Margarine laws were enacted by more than one-half of the States before the first Federal margarine law was adopted in 1886. The complex motives for these laws have been discussed above. The various State taxes, assembled in Table VI, fall into four main groups:

- a. Those States imposing excise taxes and/or license fees on all margarine (12 States: Connecticut*, Idaho, Iowa, Massachusetts*, Montana*, North Dakota, Pennsylvania*, South Dakota, Utah, Vermont*, Washington and Wisconsin; an asterisk indicates license fees only). The range is from 5 cents, e.g. Utah, to 15 cents, e.g. Washington and Wisconsin, per pound; and license fees range from \$1 to \$1,000 per year, e.g. \$400 per year on all retailers in Montana and \$100 per year in Pennsylvania.
- b. Excise taxes and license fees imposed on margarine that does not contain specified percentages of animal fat (e.g. Wyoming, requiring that margarine contain 20 per cent animal fat; Nebraska, 50 per cent; and Minnesota, 65 per cent).
- c. States imposing excise taxes and license fees on margarine containing any fat or oil other than certain specified fats and oils (usually soybean, cottonseed, peanut, etc.). There are 11 States in this group. The laws with these specifications are referred to as the Domestic Fat Margarine Laws. For the period of the war, or so long as the use of coconut, babassu, or other oils of high lauric acid and glycerine content are distributed only on the highest priority, it is not likely that these laws will restrict or prohibit the manufacture and sale of margarine.
- d. Laws absolutely prohibiting the sale of colored margarine in 29 States, the use of any margarine in 14 State institutions, and carrying restrictive labeling provisions in 27 States. It is interesting to note in this connection that four State legislatures (New York, Iowa, Oregon and Pennsylvania) have recently enacted statutes suspending for the duration of the present war the State institution prohibitions against margarine. Arkansas and Missouri require that dishes upon which margarine is served be clearly labeled with the term "oleomargarine"; New Jersey requires that a black stripe or band, 3 inches wide, extend completely around all containers of margarine; Alabama demands that all containers be marked "substitute for butter" in black Gothic letters, 1" x 1". Many States require that stores selling margarine or public eating houses serving margarine make the fact known in some conspicuous way.

TABLE VI—State Taxes on Margarine, as of June 1, 1943. (Data compiled in part from reference #11 and from independent surveys.)

State	Rate of excise per pound	Annual license fees				Remarks
		Manu- facturers	Whole- salers	Re- tailers	Restau- rants	
	<i>Cents</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>dollars</i>	
Connecticut...			100.00	6.00	3.00	
Idaho.....	5		200.00	50.00		10¢ per lb. when colored
Iowa.....	5					
Massachusetts.....				.50		
Montana.....			1,000.00	400.00		
N. Dakota...	10	10.00	5.00	2.00		
Pennsylvania.....		1,000.00	500.00	100.00	50.00	Boarding houses \$10 per year Consumer fee \$1 per year
S. Dakota....	10					10¢ per lb. when colored
Utah.....	5			5.00		
Vermont.....			25.00	25.00		
Washington...	15					
Wisconsin....	15	1,000.00	500.00	25.00	25.00	Boarding houses \$5 per year
Nebraska....	15	100.00	25.00	1.00		Tax free with 50% animal fat
Minnesota...	10	1.00	1.00	1.00		Tax free with 65% animal fat
Wyoming....	10					Tax free with 20% animal fat
Arkansas....	10					Tax free when made from domestic fats
Colorado....	10	25.00	25.00			
Florida.....	10					
Georgia.....	10					
Kansas.....	10					
Louisiana....	12					
Maine.....	10					
Mississippi...			100.00	10.00		
N. Carolina...	10		75.00			
S. Carolina...	10					
Tennessee....	10	300.00	75.00	5.00		Not exempted when colored
Texas.....	10					

This year Oklahoma repealed its margarine law which included a 10¢ per pound tax on all margarine, license fees, State institution prohibition, etc., and California repealed its \$5.00 retail license fee.

V. SUMMARY

1. Margarine fortified with vitamin A in accordance with Food and Drug regulations supplies an important amount of this nutrient as well as of much needed fat. A previous recommendation of the Food and Nutrition Board that all margarine be fortified is reaffirmed. Because of the high proportion of margarine now fortified, mandatory requirement of fortification for all margarine for table use seems unnecessary at present, though it may become desirable if the situation changes in such a manner as to reduce importantly the proportion now fortified.

2. The present available scientific evidence indicates that when fortified margarine is used in place of butter as a source of fat in a mixed diet, no nutritional differences can be observed. Although important differences can be demonstrated between different fats in special experimental diets, these differences are unimportant when a customary mixed diet is used. The above statement can only be made in respect to fortified margarine and it should be emphasized that all margarine should be fortified.

3. It is obvious that the present excise and license taxes imposed by both Federal and State governments on margarine interfere with the distribution and utilization of certain of our fat resources, but the implications of these taxes are so extensive and complex that no recommendation with respect to them can be made in this report.

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